ROCKS and MINERALS

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ROCKS and MINERALS PEEKSKILL, N. Y., U. S. A.

The Official Journal of the Rocks and Minerals Association

Chips from the Quarry

PETER ZODAC

An Inspirational Visit

For the first time the other day we visited the Children's Museum at Brooklyn, N. Y., where Mr. Joe Boyle, Curator of Mineralogy, took us in charge and proceeded to show us around. It did not take us long to discover that Mr. Boyle is doing a marvelous piece of work in bringing mineralogy to the youngsters of the city. We were so deeply impressed we plan to repeat our visit for the purpose of making some notes for an article regarding Mr. Boyle's methods in ROCKS AND MINERALS. For among all things, the youngsters even issue their own mineral magazine, a little publication of 4 pages, called *Pay Dirt*.

During our visit we met one of the children, Carmine Venuto. He must have been about 11 or 12 years of age, a very likeable boy and an enthusiastic mineralogist. He showed us a few specimens which he had purchased from Arthur Montgomery, whose exhibit he had attended Dec. 28th-30th, and then to our amazement stated that every time he gets $2 or $3 saved up he uses the money to purchase specimens for his collection —not the 5c or 10c type but the 25c, 50c and even higher.

Here is a youngster who will make a *real* mineralogist when he reaches maturity because even at this early stage of his career he realizes that in order to have a well-rounded collection, one that would be attractive, interesting, educational and of value, he needs good specimens from all over the world. When he reaches his 21st birthday he will have a collection he can well be proud of.

How different is his case from that of the average adult who decides to make a collection of minerals. The policy of the older individual is not to spend any money on minerals but to collect them all personally at their sources. Not being educated along mineralogical lines and refusing to heed the advice of seasoned collectors, he soon acquires an accumulation of boulders, cobble stones, dirty pebbles, broken crystals, decomposing rocks and other miscellaneous junk which he has the audacity to call a "mineral collection."

More power to Joe Boyle of the Children's Museum and for the work he is doing. We wish we had more Joe Boyles scattered throughout the country engaged in similar work. Then would America be proud of her mineralogists and mineral collectors.

Peter Zodac

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THE MINES AND MINERALS OF THE TRI-STATE DISTRICT

By ERNEST J. PALMER

The Tri-state Lead and Zinc Mining District takes its name from the fact that it is located in southwestern Missouri, the extreme southeastern corner of Kansas, and northeastern Oklahoma. Most of the mines are found within an area of fifty or sixty square miles, and the value of the zinc ore that has been taken from them exceeds that of any like area in the world. Of more interest to the mineralogist is the fact that scarcely any other region in the United States furnishes such a large variety of beautiful and interesting mineral specimens; and some of the finest specimens of calcite and of lead and zinc ores in the large museums of the world have come from this district.

Unlike most mining camps, this district is not located in a remote or mountainous part of the country where travel is difficult and where mining is the only industry and inducement to population. The general region in which the mines are found is mainly a rolling prairie to the west of the Ozark plateau. It is traversed by many spring-fed streams flowing through wooded valleys and bounded by scenic limestone bluffs. The country is rich agriculturally, with many fine stock and grain farms, and sections of it are famous for their orchards and vineyards and for the strawberries that are shipped by the hundreds of car loads to all parts of the country. The mineral deposits, though so extensive and commercially important, are localized in a few sections. United States Highway 66, sometimes called the Main Street of America, traverses the district from east to west, and highway 71 running north and south passes through Webb City and Joplin on the eastern side. A network of other paved highways connects all of the towns and mining camps of the district.

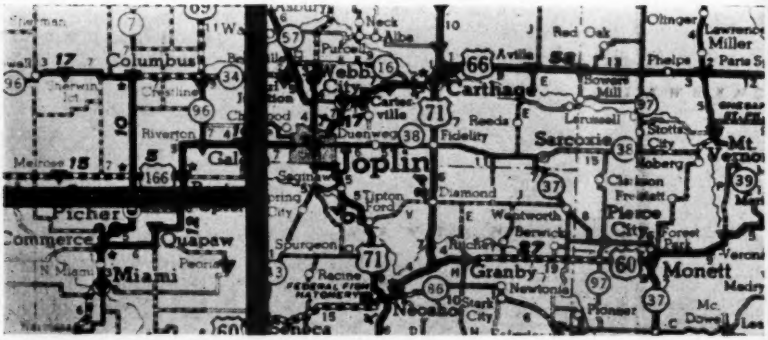
Until quite recently all of the mining was in Missouri, except a small area just across the state line in Kansas. Most of the land in this part of the country was taken up as homesteads before the middle of the nineteenth century by pioneers from Virginia, Kentucky, Tennessee and other states. Lead ore was discovered in several localities soon after the settlement of the country and mining was carried on in a small way before the Civil War. During the war there was a struggle for possession of the mines and both the Union and Confederate forces in the West obtained lead for bullets here. The first min-

ing booms and extensive exploitation of the mines began in the eighteen-seventies when lead was discovered about the future sites of Joplin, Webb City and Carterville. Granby and Oronogo were other early mining camps that have had a continuous history of production. The Granby mines have furnished some of the rarest and most interesting minerals of the region from the scientific standpoint.

The Oronogo Circle is one of the historic mines from the standpoint of long operation. The name of this town is unique and has an interesting history. The story goes that when lead was first discovered some enterprizing promoters laid out a town site but were at a loss to find a name for it. Someone suggested that if the ore didn't hold out the place would be no go and would need no name. So they named it Or(e)-o(r)-no-go. After the discovery of lead ore, Joplin rapidly forged ahead in population and it was incorporated in 1873. It was destined to become the metropolis of the mining region which became world famous under the name of the Joplin District. As the greater part of the mining in later years centered about Webb City, Carterville and a number of smaller camps, much local jealousy and rancor developed as to which towns should get credit for the output. The name Tri-state District became current only recently after most of the mining activity was transferred to northeastern Oklahoma.

Lead ore was the only mineral sought or known in the early days and wherever it was discovered in large quantities a settlement soon

MAP OF THE TRI-STATE DISTRICT



Unfortunately the state lines are shown as very heavy black lines which almost obliterate names of Galena, Kans., and Waco, Mo. which are almost on the state line. On the map, Galena (Gal) is west of Joplin and Waco (Wa) is north of it and near the top of the map. The location of Oronogo, Mo., is marked by a large black dot almost touching the W of Webb City.

The upper left section is Kansas; lower left is Oklahoma; and the section to the right is Missouri. Scale 1" =approx. 18 miles.

(Courtesy of Conoco Travel Bureau)

sprang up and miners and fortune seekers rushed in. The mining camps were of mushroom growth and many of them were short lived. Living conditions were most primitive and lawlessness and vice often prevailed, equalling anything shown in the popular "western" scenerios.

The discovery of mineral and the real estate developments that followed brought quick returns to the land owners, and some of them who had the business sagacity to hold on became wealthy through the growth of the successful towns or from mineral royalties. The ore was found near the surface in a soft formation that was easily mined, and it required little cleaning. The miners obtained a lease on lots or acreage from the owner of the land or from a company organized to develop it, and a royalty was paid on all ore taken from the ground. Royalties ranged from fifty per cent on some of the early mining down to twenty per cent, or as low as ten per cent on zinc ore when it was discovered in later years.

Under the leasing system and with the easy and primitive mining methods, little capital was required beyond a pick and shovel and a strong back to enable their possessor to become an independent operator. Sometimes fortune was kind and the miner suddenly found himself transformed from poverty to affluence. The money quickly made was often as quickly parted with, most of it going over the counters of the saloons or gambling houses or in other forms of vice. But some of the more prudent laid the foundations of lasting fortunes on their lucky strikes.

The leasing system was largely continued until recent years, and this system in connection with the character of the mineral deposits and their geographic location resulted in the development of social and industrial conditions somewhat different from those of most mining communities.

The system had both its good and bad features: it was extremely democratic and class distinctions between owners and employers and the workers were not sharply drawn or were developed slowly. Most of the mine workers have always been recruited from the Ozark region to the east and south in Missouri and Arkansas; others have come from the poorer parts of the farming states of Missouri, Kansas and Oklahoma, and a small percentage from the mining camps of the West. The Ozark region was settled by people of Anglo Saxon and Scotch-Irish stock, and there has been very little infiltration of foreign elements. Living conditions have remained primitive and economic standards very low, the cash incomes of many families even today being scarcely one hundred dollars per year. By comparison, the money that could be made in the mines through a lucky strike or even as wages was real wealth. Foreigners have always been unpopular with the miners and few of them came to the district. No Negroes were allowed to work in the mines and the few who managed to find other employment in the mining towns lived rather precareously.

The ambition of nearly every early miner was to make a strike and become an independent operator. Many of them would "prospect" until their resources and credit were entirely exhausted and would then work for wages until they had gotten enough ahead for another "grub stake."

Labor organizations made little progress in the district during the early or boom days of the mines. Men who might this week be working for

wages and the next working on their own or perhaps employing labor were not likely to be sympathetic to labor unions. As the industry grew and a larger proportion of the men became wage earners, local unions were sometimes formed and there were occasional strikes. But the strikes usually resulted in failure and the unions were short lived.

The system of small proprietorship and lack of capital resulted in many cases in the use of poor equipment and laxity in the enforcement of mining laws and precautions against accident and disease. Fatal accidents and injuries often involving the loss of sight or of limbs were of too frequent occurrence, and the death rate from silicosis or "miner's consumption" became in time a national scandal. A sort of fatalistic philosophy prevailed among the men, and it was a common saying that a man couldn't be killed until his time came and that then nothing could prevent it. When some of the larger mines attempted to introduce better health and safety rules, they were even resisted by the men.

A sort of tacit understanding grew up between the operators and the men that so long as labor unions were kept out of the district no foreign or colored labor would be brought in. On the strength of this unwritten convention the district has always remained non-union; and in times of labor troubles in the western mining regions it has on several occasions been a field for recruiting strike breakers. As a result the Missouri miners naturally came into rather bad standing in the unionized mining camps of the West. In justice to the men it should be stated that in some cases at least they were enlisted by unscrupulous labor agencies and did not know that a strike was in progress until they had been transported to the scene of the trouble.

The machinery and methods employed in the western metal mines were quite different from those of the Missouri lead and zinc mines, and the men had to receive special instructions until they became familiar with them. It is said that the quip that has since become nationally famous and that has given a nickname to the state originated in this way. The instruction was passed out—"This man is from Missouri. You'll have to show him how to work." Some wit among the miners saw a chance to turn this on occasion to his own advantage—"Yes, I'm from Missouri; you'll have to show me—i. e. You needn't think you can put anything over on me."

The Joplin miner—for it was under that name that he became nationally known—was a real type and character; sharp witted, intolerent of shams and "put-on," reckless of his own life and of the lives of others, making money easily, as it seemed to him, when times were good and squandering it quickly. He was free hearted and generous to his friends or to anyone in distress, and on many occasions he proved himself a hero in rescuing entombed or injured comrades. The district is full of the romance of the early days, and there are innumerable incidents replete with pathos or humor or heroism, most of them recorded only in the memories of the "old-timers" who are fast disappearing.

The equipment used in the shallow mines of the early days consisted merely of a hand windlass and a tub made from half of a whisky or coal oil barrel bound and baled with iron. In a two man mine, one partner working at the bottom of the shaft filled the tub with the "dirt" contain-

ing the ore and the other laboriously hoisted it to the surface by winding up the rope on the windlass spool. The next step in evolution was the building of a derrick over the shaft and of a short runaway on which the tub was pushed on a tramway to be dumped. The derrick and runway were often constructed of rough poles cut in the nearby woods, and the shaft was cribbed with similar material. A horse hoister soon replaced the windlass, lightening the labor and increasing the output of the mine. Some of the ore even in the early mines was found as veins or nuggets in masses of flint or other rock. These were broken with a sledge hammer where necessary, and the process was known as "bucking the rock." The ore was then roughly sorted with a many-pronged steel cull-fork, and finally cleaned on hand jigs. The jig consisted of a wooden box with an open bottom of grating or rods placed near together. This was suspended at the end of a lever over another larger box filled with water. The broken rock and dirt containing the ore was placed in the upper box and the jig-man standing on a spring board at the end of the lever imparted a quick up and down motion to it. The water forced up through the mass brought the lighter waste material to the surface where it was skimmed off leaving the heavy ore at the bottom. The same principle is still used for cleaning the ore in the largest modern mills.

With the working out of the richer surface deposits the shafts were sunk to greater depths and operations were undertaken on a larger scale. By the late eighteen-eighties outside capital had begun to come into the district and plants and machinery were rapidly modernized. Although from the nature of the deposits most of the

Mining Plant and Group of Miners, Webb City, Mo. About 1910

mines remained small units, some of the larger gave employment to two or three hundred men when running full time. But prospecting and small scale operations by working miners or in partnership with local business men continued in many places, and the methods and equipment used in the small mines were sometimes almost as crude as those of the early days.

Mining activities fluctuated with the price of ore and the district has passed through a number of booms and depressions. The greatest boom in its history came soon after the breaking out of the great war in Europe, as the Allied Governments began bidding madly for zinc ore for munition making. In about a year the price of ore had doubled and then quadrupled. As a result old mines were reopened everywhere in the district and prospecting for new deposits was carried on with feverish activity. The population of some of the mining towns was doubled in a short time. With many of the recent arrivals living in tents, temporary shacks, old cars, and even covered wagons, conditions again resembled those of the early days. This prosperity was of short duration, however. Even before the end of the war the demand began to slacken and the artificial stimulus of war prices was found to have resulted in an expansion far beyond normal demands.

It was during this period that extensive deposits of rich ore were discovered in northeastern Oklahoma. The deposits were of such a nature that they could be worked at a much lower cost than the "sheet ground" about Webb City and the other Missouri camps. The mine operators quickly realizing the advantages of the new field began securing leases and moving across the state line. One large frame mill after another with all the heavy machinery used in crushing and cleaning the ore was torn down and moved in sections to be rebuilt over the new mines in Oklahoma, and in a surprisingly short time the camps that had been so productive for many years were practically abandoned and deserted. As the pumps were shut down and removed, the water rose in the drifts and shafts and the small operators were also forced to give up. For a number of years almost the only activity in the Missouri field was the loading and shipping of the crushed rock or "chats" to be used as road material or for railroad ballast. Recently, however, large pumps have been installed in some of the old mines with the aid of the Federal Government, and the ground is being drained and operations resumed at a number of places.

The ore deposits of the Tri-state District are very irregular in size, depth, and in the character of the formation. The country rock is a semi-crystalline limestone of marine origin and of Lower Carboniferous age. The beds are generally horizontal or nearly so, and there is little faulting or tilting. Nowhere in the district are there intrusions or dikes such as are found in most mineralized areas. Impure flint or chert is found in great quantities interbedded with the limestone in many places. The chert occurs as nodules and bowlders of all sizes and shapes, or sometimes as solid layers or strata between beds of limestone. In some parts of the district chert predominates and forms deposits sixty to one hundred feet in thickness.

The limestone is of organic origin and was formed by the accumulation of the calcareous shells of marine animals, brachiopods, crinoids, corals and other forms of invertebrate life that

Interior View of Mine Waco, Mo.

piled up through long ages on the bottom of the Carboniferous seas. Evidences of fossils can be seen almost anywhere on weathered surfaces, the detached sections of crinoid stems being most abundant. Beautifully preserved fossils in great variety and abundance are found in some localities, and several hundred species are represented in the writer's collection. The chert is also sometimes fossiliferous, but in this formation the shells have been removed by solution leaving an external mould and an internal cast of the shell or other fossil. The casts often fall out clear and free when the rock is carefully broken, and some of them are beautifully sharp and clean. The district is therefore a happy hunting ground for the paleontologist as well as for the mineral collector.

Since limestone is soluble in water charged with organic gases, it is constantly being carried away in solution both by surface and underground erosion. And the Tri-state District, like all limestone regions, abounds in caves, sink-holes and underground water courses. Through all the long geological ages that have passed since this part of the country was elevated above sea level this process has been going on, and hundreds and perhaps thousands of feet of limestone strata have been removed. One of the most generally accepted theories of geologists as to the origin of the ore deposits is that they have been formed by concentration and enrichment from minute particles contained in the overlying rocks that have been removed in this way.

As the chert is much more resistent than limestone and weathers or dis-

solves very slowly, great quantities of it have been left as residual deposits on the surface or as accumulations in underground cavities. Subterranean deposits consisting of broken angular fragments of all sizes have in many places been fused together into a loose or solid breccia by the intrusion or infiltration of other rock-making material. And it is in such brecciated formations that some of the richest ore deposits are found. Nearly all of the early mining was in a formation of this nature, which was known by the miners as "open ground" or "soft ground." Mining in such places is often dangerous and the mines require heavy timbering.

In some of the more massive chert formations the ore was deposited in the small fissures and crevices of the massive beds. The percentage of ore in such deposits is comparatively low and they require a different type of mining. It is known as "sheet ground" by the miners, and all of the rock at the ore bearing level is blasted out in regular tunnels and galleries, leaving only pillars to support the roof, as in coal mining. The ore bearing rock is then all passed through the mill and crushed to a small size for the extraction of the ore. The greatest variety of minerals and some of the most beautiful specimens are found in the open ground mines, but fine crystallized specimens are also sometimes found lining cavities in the harder formations of the sheet ground.

The minerals of the Tri-state District have been mentioned and described in various publications. Geological reports of the states of Missouri and Kansas are the chief source for information on the subject. The commercially valuable ores have naturally received the fullest treatment in these reports, but many of them also contain lists and descriptions of the associated minerals. A number of papers on the different minerals have also appeared in scientific publications. A partial bibliography of these publications is given in the eighth volume of the University Geological Survey of Kansas, published in 1904, in a paper entitled "Minerals of the Galena-Joplin Lead and Zinc District," by Austin Flint Rogers. This is perhaps the most complete and convenient treatment that has yet appeared, and it has been consulted in preparing the following list.

Galena. This is the common lead ore mined in the district, and it is abundant everywhere. It crystallizes in the cubic system and has perfect cleavage in three directions, splitting into cubes of all sizes. Cleavage specimens several inches in diameter are readily obtainable. Cubic crystals ranging in size from minute to two or three inches in diameter are found abundantly lining cavities or seams, and in some specimens octahedron faces are developed. The faces usually have a brilliant metallic lustre and are nearly plain or variously etched. Grouped and aggregated crystals of various sizes and set at all angles make most attractive specimens, especially when they are found in combination with other minerals, such as dolomite, sphalerite, marcasite or chalcopyrite. Traces of silver are almost always present in galena, but the percentage in the ore of this district is too small to pay for separating it. Etched and skeleton crystals, and crystals or masses of galena partly altered to cerussite or other secondary lead minerals, are frequent at shallow levels in some localities and pseudomorphs of these

minerals after galena have been found.

Cerussite. "Dry bone." The carbonate of lead was formerly produced in considerable quantities in different parts of the district and commercially valuable deposits are still sometimes found. It is always a secondary mineral produced by the action of surface water upon galena, and it is therefore usually found near the surface. Cerussite as found in this district is usually not a showy mineral. It occurs commonly as earthy masses of a grayish color or with seams showing surfaces covered with very small crystals. Interesting orthorhombic crystals are sometimes found in cavities or on etched surfaces of galena crystals. Twins and stellately clustered crystals are abundant in colors ranging from white to various shades of green and yellow, or sometimes brown or black.

Anglesite. This sulphate of lead is often found associated with cerussite, but it is much less abundant. It is not distinguished from the carbonate ore by the miners, and it is not always possible to identify it except by chemical test. Earthy and massive forms predominate with small tabular or prismatic orthorhombic crystals developed in small opening in the massive form or in galena crystals.

Pyromorphite. Green lead ore. This is another secondary ore of lead resulting from the decomposition of galena, and it is often pseudomorph after that mineral, with parts or all of the cube outlined as a thin crust. Stalactitic and botryoidal forms have also been found in the district. The crystals are usually very small, consisting of a simple hexagonal prism with truncated ends. The color is green or greenish brown. This is a comparatively rare mineral in the district.

Leadhillite. This rare mineral, a sulphate and carbonate of lead, has been found in the district only at Granby, Missouri. The crystals are slender hexagonal prisms or thick hexagonal tables, grouped in parallel position lining cavities. The crystals are nearly colorless or sea green in the larger ones. It is us ually pseudomorph after galena or calcite, and some remarkably fine specimens of the latter form have been found, and have been illustrated in several papers and geological reports.

Chalcopyrite. This copper and iron sulphide is the only copper bearing mineral that is at all common in the district. It is widely distributed but never found is sufficiently large quantities to be commercially valuable. The crystals are tetragonal or of true pyramidal form with sharp angles and a brilliant metallic, brassy luster. The surface of the faces is usually slightly roughened or striated. Crystals up to a quarter of an inch in diameter are sometimes found, although they are usually much smaller. Small crystals are commonly found scattered over the surface of pink dolomite, and they also occur on sphalerite crystals, arranged in parallel groups. Chalcopyrite is seldom found in the massive form in the district, and only in small quantities. Azurite, malachite, cuprite, chalcanthite and chrysocolla have been recorded as occurring in small quantities in some parts of the district. All of them have probably been derived from the alteration of chalcopyrite.

Pyrite. "Mundic," in part. Pyrite is commonly found in the district as

small crystalline masses of distorted cubes fused together. The faces are usually striated and imperfectly developed. It is generally found in soft formations, such as shale or clay. Masses six or eight inches in diameter are sometimes found, but these are exceptional. The mineral is too well known to need fuller description.

Marcasite. "Mundic," in part. Marcasite is very abundant in all parts of the district and is much commoner than pyrite. The two minerals are chemically identical, but differ in the form of crystallization and in weight and color. It is supposed that these differences are due to the conditions under which the minerals were precipitated, marcasite having crystallized more rapidly from a cold solution. The crystals of marcasite are orthorhombic, usually grouped in radiating masses. They are flattened in the direction of the vertical axis and generally curved and striated on the faces. The color is brassy yellow, or sometimes with a greenish or brownish tinge. A form called "coxcomb marcasite" is abundant, in which the faces of the large crystals are very convex with a series of parallel grouped, partially developed individual crystals. Large groups of this form are often deposited on slabs or fragments of chert. Smaller crystals are often found on galena, sphalerite and other minerals. Pyrite and marcasite are not distinguished by the miners and they have generally had no commercial value, but on the contrary have been considered a great detriment, as they lessen the value of the ore and are very difficult to separate from it. However, during the war years considerable quantities of "mundic" were mined and shipped to chemical works to be used for the manufacture of sulphuric acid.

Limonite. Brown iron ore. The hydrous oxide of iron is very common as a red or brown stain on rocks throughout the district, and it sometimes occurs as thin layers filling fractures in chert, or locally as a cementing material in breccia. Stalactitic forms and "pipe ore" are also occasionally found, which have formed in the interior of geodes or small cavities. And limonite pseudomorphs after marcasite, pyrite and chalcopyrite are not uncommon.

Sphalerite. "Jack." This is commercially the most important mineral found in the district and thousands of tons are produced every week when the mines are in full operation. When pure, sphalerite contains 67 per cent zinc and 33 per cent sulphur. However, iron is nearly always present as an impurity, detracting from the value of the ore. Crystallization is in the isometric system, tetrahedrons and dodecahedrons being the commonest forms. Crystallized forms are very abundant in cavities and seams. When pure the color is amber or resinous, but it becomes darker in proportion to the amount of the iron impurity contained, and it is usually brown or nearly black. Crystals of a red color are known as "ruby jack," and sometimes the surface of the dark variety has a bluish luster and is called "steel jack." Free crystals are sometimes found in clay or soft shale. Single crystals vary in size from very minute to an inch or more in diameter, and they show a surprising variety of forms and of surface modification and etching.

Smithsonite. "Carbonate." Zinc carbonate is common in some parts of the district and large quantities of it have been mined, although little is produced at present. It is usually found near the surface or at moderate depths overlying the sphalerite, from which it was derived. Most of the ore is massive and earthy, but pretty crystallized specimens are found in cavities and seams. The crystals are rhombohedral and they are usually very small and closely grouped in small globular or botryoidal masses with only a small part of the curved faces exposed. When pure the mineral is colorless, but it is usually tinged with yellow or brown, and with a vitreous or pearly luster. Stalactitic forms of smithsonite are also found, and pseudomorphs after calcite occur at Granby.

Calamine. "Silicate." The hydrous zinc silicate is found in considerable quantities in some parts of the district. In its common earthy or massive form it closely resembles smithsonite, and it is sometimes difficult to distinguish the two minerals without a chemical test. It is a simple process, however, as smithsonite effervesces in the presence of acid, and calamine does not. The crystals are orthorhombic, usually aranged in radiating groups or in parallel or approximately parallel position with only a small part of each crystal showing. Pure calamine is colorless or white, but forms found in this district are usually brownish or gray-brown. Globular, mammillary, and stalactitic forms are also found, and pseudomorphs after dolomite and calcite occur at Granby and at few other places.

Wurtzite. Small to very minute brownish-black crystals of hexagonal pyramidal form are found in cavities of sphalerite or of massive wurtzite at several localities. But it is one of the rare minerals of the district.

Aurichalcite. This mineral has been found in small quantities at Granby, Missouri, and at Galena, Kansas. The crystals are small and drusy and of a bluish-green color.

Hydrozincite. "White jack." This occurs as incrustations or as thin layers associated with calamine and smithsonite. It is also sometimes found in mammillary or stalactitic forms. The color is dull white.

Covellite. Small quantities of this mineral have been found near Galena, Kansas, occurring as a black coating on sphalerite or replacing sphalerite crystals.

Greenockite. Cadmium sulphide is found at several places in the district, occurring as a greenish-yellow coating on sphalerite. It is a rare mineral and one of considerable interest to mineralogists.

Barite. "Heavy spar," "Tiff." This mineral is found in small crystallized masses throughout the district, but never in large quantities. The crystals are orthorhombic and tabular, variously grouped and usually distorted by contact with each other. The color is opaque white to greenish-blue, with a vitreous luster. They are frequently an inch or more in longest diameter. Barite is not sufficiently abundant to be of commercial value in this district, but it is extensively mined in central and eastern Missouri. It is used, when finely powdered, for a filler in cheap grades of paint and in rubber goods, oil cloth and glazed paper, and in various chemical compounds.

Dolomite. "Spar." The gray mas-

sive form of dolomite forms thick beds in some parts of the district, where it has apparently replaced limestone. It is also common in the crystalline form in seams and cavities. The crystals are rhombohedral with curved faces and sharp edges. The color ranges from white to pale pink, the latter being commonest in the district. Crystals of a gray color are also sometimes found. The pink crystallized form makes very pretty cabinet specimens, and crystals of other minerals, including sphalerite, galena, marcasite, chalcopyrite and calcite, are often found deposited upon the dolomite.

Calcite. "Tiff." Calcite is one of the most abundant and also one of the most attractive and interesting mineral of the Tri-state District. It occurs in a great variety of crystal forms and specimens from the mines here are found in all of the large museums and in most of the private mineral collections of the world. Crystallization is in the hexagonal system (hemihedral) and there are all sorts of variations of the rhombohedron. About 30 forms of crystals have been described from this district. Scalenohedrons and rhombohedrons are the commonest in most localities. Small sized crystals up to an inch in length are found almost everywhere covering surfaces in seams and cavities. Some very large crystals are found lining the walls and all sides of water-filled caves. Occasionally specimens from a foot to two feet in length are encountered in such places. Twins and groups of all sorts as well as double terminated crystals are abundant. Small crystals are sometimes almost colorless and limpid, but the color usually ranges from very pale to deep golden yellow or brown. Pale violet or lavender calcite has also been found near Webb City and Joplin. Pale brown is the commonest color in the large crystals. But in the "golden calcite" the color ranges from pale yellow, sometimes with a tinge of violet, to a rich golden amber, the color becoming deeper towards the ends of the crystals. The brilliant fire of these crystals is very striking, and they are unmatched for quality anywhere in the world.

Calcite is comparatively soft and fragile, having a hardness of 3 in the scale, and great care has to be taken in detaching and handling the crystals to prevent scratching or breaking. Cleavage is free in three directions, and cleavage specimens up to several inches in diameter are readily obtainable.

Quartz. No pure quartz is found in the district in the massive forms. Chert, an impure form of flint, is one of the most abundant rocks, as has been previously mentioned. It assumes many forms and varies greatly in physical character. The structure is often porous and comparatively soft and chalky due to a partial decomposition of the chalcedony grains; and this is particularly the case in residual material that has long been exposed to surface erosion, as well as in the outer layers of nodules and bowlders. The partially decomposed surface chert is sometimes called "cotton rock." It is used for masonry and for foundations and walls, as it can be worked into rough blocks with a stone hammer. Large deposits of a very soft porous chert of this nature have been mined extensively at Seneca, Mo., under the name of "tripoli." It is used in the manu-

facture of filters and for abrasive powders. Some of the chert, on the other hand, is very dense and hard and breaks with a sharp conchoidal fracture. The cherts of this district range in color from a chalky white to gray or blue, and some forms are mottled or banded with different shades or colors.

In various parts of the district a dark colored chert has been formed by solution and redeposition of the silica. This has been called "cherokite" and also "jasperoid" by different authors. The color ranges from dark gray to almost black. It frequently serves as a matrix or cementing material for angular fragments of the primary, lighter colored chert, forming a breccia. The breccia is some times so dense and homogeneous that it can be broken with a smooth clear surface through both formations, and where the contrast of colors is sharp, it makes interesting cabinet specimens.

Quartz crystals lining small pockets or cavities in the harder forms of chert are not uncommon, although they are usually of small size. Drusy coatings are abundant both in the primary and secondary chert. Chert nodules of approximately globular form, sometimes found in soft ground, are called "mineral eggs" by the miners; and some of these have small cavities in the center lined with quartz crystals, being therefore thick-walled geodes. Quartz crystals nearly an inch in length have been found at a few localities in the district, but specimens of this size are extremely rare.

A number of other minerals have been reported from the Tri-state District; but most of them are either so rare as to be negligible or are of such poor quality or of so uninteresting a character that they are of little concern to the average collector. The following list is taken largely from the paper by Prof. Austin Flint Rogers, referred to in a previous paragraph: Allophane, aluminate, aragonite, bitumen, caledonite, chalcedony, copiapite, cuprite, dendrite (pyrolusite), goslarite, gypsum, hematite, kaolinite, linerite, melanterite, mimetite, muscovite, picrophamacolite, sulphur, vivianite and wavellite.

Paragenesis of the minerals. The successive order in which the different minerals were deposited is clearly shown in many specimens. While there is no invariable order of priority, some are found to have generally been formed earlier than others. Dolomite, galena and sphalerite are typically among the older minerals, and marcasite, pyrite, chalcopyrite and calcite are amongst the later ones. This is shown by the fact that while galena and sphalerite are frequently deposited on dolomite, the other minerals, such as pyrite, marcasite and chalcopyrite, where they are present in combinations, are nearly always formed on the galena or sphalerite crystals or directly on the dolomite. There are exceptions to this order; and the fact that sphalerite is still being deposited under some conditions is shown by miners' picks and other pieces of iron recovered from old mine workings with sphalerite crystals formed on them.

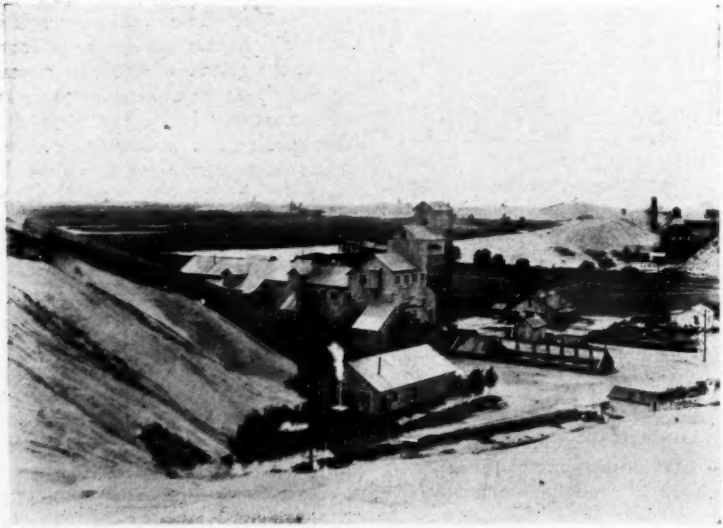
Collecting in the Tri-state District. The mineral collector who expects or hopes to visit the district will be interested in knowing what he may expect to find and where to look for specimens. It is not a simple question to answer, for it must be remembered that it is not as in many localities a question of visiting one or two large, easily located, mines or quarries, but that here there are scores and perhaps hundreds of mines large and small in

operation and literally thousands of abandoned shafts and dumps widely scattered over parts of three states. The older mining camps, now largely abandoned, present a strange sight, unlike anything to be seen elsewhere in America, or in the world so far as I am aware. Over many square miles the surface is covered with piles of bowlders or of crushed rock, some of the tailing piles ccvering many acres and rising like miniature Rocky Mountains gray against the sky line. And in many places there are deep holes and caverns where drifts and underground workings have "caved in," sometimes carrying derricks and abandoned machinery with them.

It is a slow and difficult process, and in some places a dangerous one, to explore such ground in detail. And while many of the old dumps are of much interest to the fossil hunter or to the student of rocks, and some of them may furnish interesting mineral specimens, the rewards are likely to be small unless you know the localities in detail or have a guide who knows them.

Most of the mining activity is at present centered about Picher, Oklahoma, and a visit to that section is worth while, if only to see the many large mills in operation. It is a busy and astonishing sight and a great contrast to the abandoned parts of the field, although the operations about Webb City only a few years ago were perhaps on even a larger scale. It is interesting to note also that the shift of operations was not due to the fact that the mineral deposits were worked out, but merely to temporary economic conditions, and that some of the mines have recently been reopened and are now in operation after twenty years of idleness.

As most of the minerals of this district deteriorate quickly when exposed to the weather, the best places to look



Mining Scene, Picher, Okla.

for specimens is on the dumps of the operating mines or those that have been in operation within a year or two. The dumps at most of the modern mills consist largely or wholly of finely crushed rock, or chats, from which the ore has been extracted. Such piles naturally yield no good mineral specimens. On many fresh bowlder piles specimens showing veins or small crystals of sphalerite or galena as well as calcite, marcasite and other minerals can be found. Good specimens of cleavage calcite and of the smaller crystals are common in many places. Good specimens of the prettily crystallized pink dolomite may be broken from the large bowlders thrown out at many mines, and sometimes fresh loose specimens of marcasite or barite can be picked up on dumps. The finer and large specimens of calcite and of the lead and zinc ores and most of the other minerals have to be collected and handled carefully in the mine workings or caves where they occur, and they can only be secured from the miners or from dealers who collect them.

In the earlier days almost every miner took specimens home, and a small pile could usually be seen in the yard or on the porch of his humble dwelling, exposed to dust and weather. Naturally, they varied greatly in quality, some being battered and almost worthless and others very good and desirable. For a few cents or for a dollar or two it was often possible to buy the entire collection. It is still possible to pick up some specimens in this way, although not so cheaply or abundantly as in former years. However, in recent years since the building of highways and the increase of automobile travel has brought many tourists to the district, numerous roadside dealers have sprung up, and their displays of large calcites and other minerals on open shelves or racks cannot fail to attract attention. The outside display is largely for advertising purposes, and a stock of smaller and better specimens will be found in the shop or shed if you stop to investigate. Quality and prices, as well as the size of stocks, vary somewhat at the different stands, but many of them have a good variety to select from at reasonable prices. There is always a satisfaction to the real collector in finding specimens and collecting them personally, and much can be secured in the district in that way if you have the time. But if you are merely passing through and cannot spend several days or do not have some acquaintance who can guide you to the best localities, the most satisfactory way to secure a representative collection is through the local dealers.

At Shifferdecker Park on the west side of Joplin there is a Mineral Museum which no visitor to the district should fail to visit. Besides the splendid collection of local minerals, which is probably the best that has been brought together, models of mining plants and many other exhibits are to be seen, illustrating the development of the industry and the various uses of lead and zinc.

EDITOR'S NOTE: The foregoing article is the manuscript which won the first prize in the Prize Article Contest recently conducted in ROCKS AND MINERALS. Mr. Ernest J. Palmer, its author, had lived for many years in the Tri-state District and is most familiar with the minerals and mineral localities of this world famous area.

The manuscript which won second prize in the Contest will be printed in an early issue of the magazine.

TILLY FOSTER UP-TO-DATE

By JOHN N. TRAINER

The list of minerals reported from Tilly Foster, near Brewster, N. Y., as published in the October 1938 issue of ROCKS AND MINERALS, was compiled in April 1938. Since then four more species and two more pseudomorphs have been found as follows:

Ankerite—gray mass, coated brown, associated with clinochlore and serpentine.

Heulandite—small crystals in pyroxene.

Pyrolusite—in dendritic form on albite.

Siderite—spheroids on biotite schist.

Serpentine pseudomorphic after *chrysotile.*

Serpentine pseudomorphic after *pyrrhotite.*

The ankerite was found last November by Mr. H. Alban Anderson of Peekskill, N. Y. and the heulandite was found at the same time by Mr. M. A. Northup of Jersey City, N. J. The others were found by the writer last Summer.

The total number of species from this locality is now fifty-nine and of pseudomorphs of all kinds, twenty-nine, including twenty-one serpentine pseudomorphs.

Last Summer I spent a few hours each week-end collecting on the Tilly Foster dumps, as in the two previous Summers. In the search for minerals previously reported which were not in my collection, I was not so successful having found only garnet, and magnetite pseudomorphic after chondrodite. I still lack apatite, autunite, chrysolite, clinohumite, datolite, selenite, humite, hydromagnesite, marcasite, prehnite, stilbite and eight pseudomorphs. They will be something to look for next Summer although the law of diminishing returns is now running against me. However, to have forty-eight of the fifty-nine species and twenty-one of the twenty-nine pseudomorphs is quite satisfactory.

In addition to extending the collection as above, I also graded it up by substituting better specimens of minerals already in it and by adding good duplicate specimens and certain others of special interest. The result of the Summer's work was the addition of about seventy specimens. I am impressed with the fact that a mineral collection, in the making, is a growing, living thing although composed of inanimate objects.

Some finds of last Summer of special interest, in addition to those mentioned above, are briefly described below:

Two specimens of *brucite*—one in crystal form and another in vertical columns in a vein—both of which are rare at Tilly Foster. The crystals are small and light green and are on columnar brucite associated with dolomite.

A large *clinochlore* crystal, 2¼ inches across and 3/16 of an inch thick, without matrix.

A *dolomite* rhomb, polysynthetically twinned, with striations parallel to the short diagonal on two faces and to the long diagonal on one face. It is 4 x 4 x 3 inches in size.

Colorless *fluorite* crystals on calcite showing tetrahexadedrons and hexoctahedrons.

Ilmenite—on dolomite; a better specimen than the one found last year which was in gneiss. Subject to corrections from the readers, these two

specimens of ilmenite are the only ones ever found at Tilly Foster.

A *pyrrhotite* crystal in form like a truncated cone—one inch across the base, a half-inch across the top and one and a half-inches high. The matrix is massive pyrrhotite. I now have two of these rather rare crystals.

A clean cut cast of rich green *serpentine,* exposed on breaking a large piece of dolomite. It resembles an arrow-head, one inch wide, one and a half inches long, a quarter of an inch thick at one end and tapering down to a sixteenth. It is a pseudomorph of a cavity or cavity filling in the dolomite.

A rich *yellow serpentine* and also two specimens of *gray colloidal and botryoidal serpentine.*

Serpentine Pseudomorph after fine crystals of actinolite and additional specimens of *serpentine after periclase* (?) which is one of the most interesting minerals at Tilly Foster.

Serpentine pseudo after chrysotile. Some time ago I bought a piece of serpentine labeled "picrolite" which it obviously was not but which might have been pseudomorphic after brucite. I was hoping to find brucite in the same form. However, last Summer, I found the key to the problem in several specimens showing that chrysotile had altered to serpentine. In the center of one piece is a thin horizontal seam of the unaltered chrysotile. This pseudomorph is listed above as new to Tilly Foster.

Serpentine var. chrysotile pseudo after pyroxene var. diopside, as a one inch seam with chondrodite in magnetite. The Tilly Foster records show serpentine pseudo after pyroxene but not a variety after a variety.

Serpentine pseudo after pyrrhotite, tabular, brown, with magnetite. The records show pyrrhotite after serpentine which I am told is unlikely and which may be an error but they do not show serpentine after pyrrhotite. The specimen, size 5x3x2 inches, also has in it two fine green serpentine pseudomorphs after pyroxene imbedded in massive brown serpentine. Two serpentine pseudomorphs of different colors in one specimen is unusual.

Last Summer I worked a dump on the west side of the property which I had noticed in a photograph taken about 1875. It was then much larger than it is now; in fact it was the original dump but it is today almost entirely obliterated by trees and underbrush. There was, however, an open bank at the water's edge which had apparently not been worked by collectors in recent years. Everything was badly weathered. Here I found the serpentine cast, the dolomite and brucite mentioned above. I also found wasps; they build their nests on the undersides of rocks. You do not know they are there until you turn the rocks over and then you decide suddenly to work at other spots. The collector of snake skins would have been rewarded here; a rock pile apparently furnishes good sharp edges and angles to assist the snakes in shedding. But I have never seen a live snake at Tilly Foster.

In the latter part of the Summer, I worked along the south side of the property where the best material is to be found. I had worked the east and north sides in previous years.

The crushing plant on the north side was shut down due to receivership of the road material company. The weeds were higher and thicker than ever. The night hawks and wasps were the only signs of life. It was very lonely and quiet.

If there were any other collectors there during the Summer I did not see

them but on November 13th, I accompanied the Plainfield (N. J.) Mineral Club to the property. It was then that Mr. Northup found Heulandite which he presented to me and Mr. Anderson found the Ankerite. At that time also occurred the "riot" described in the December ROCKS AND MINERALS when the "boys" fell on and took away the last vestige of serpentine after periclase (?) which I knew about at Tilly Foster.

A NATURAL STONE FACE IN PENNSYLVANIA

By EUGENE W. BLANK
Colgate-Palmolive-Peet Co., Jersey City, N. J.

The Stone Face

The George Washington profile on the Lehigh University campus situated in Bethlehem, Pa., is well known locally and worth the attention of all ROCKS AND MINERALS readers who may happen to be traveling in the vicinity.

The George Washington profile has been an object of considerable interest since its discovery while constructing the road through Sayre Park, the upper part of the Lehigh University campus.

The rock is of the Byram granite gneiss, originally an acid granite which through metamorphism has been converted into a gneiss. The rock contains numerous joint planes, and the profile as seen from above has been produced by the rock breaking away along these joints. When viewed from the lower side the rocks present no resemblance to a face.

At times in the past the nose has been painted a vivid red by mischievous students but at present the paint has practically disappeared.

I am indebted to Dr. Benjamin L. Miller of the Department of Geology of Lehigh University for his kindness in supplying the above information and to Mr. Alvin J. Frantz of Colgate & Co., for supplying the photograph of this interesting natural wonder.

PYRITE IN SERICITE-SCHIST

At an old abandoned copper mine near Warren, N. H., some interesting specimens of pyrite cubes in sericite schist have been found by John A. Kablis of Manchester, N. H.

The sericite-schist is grayish-white in color, lustrous, and would make splendid specimens for a cabinet were it not that it is so fragile it crumbles in the hands.

A REMARKABLE MELANTERITE

By PETER ZODAC
Editor Rocks and Minerals

About four years ago there was present on the vertical face of an old abandoned emery mine near Colabaugh Pond, about 2½ miles northeast of Croton, N. Y., an incrustation of melanterite that was most remarkable for its size. It was about five feet long, six inches wide and four inches thick, of a pale apple-green color. Its lowest point was about five feet off the ground. The melanterite was of excellent quality.

The mine has been abandoned for at least 20 years and the melanterite, being a secondary mineral, had formed since that time. The mine, furthermore, is located in an area remote from much travel and may never have been visited at all by mineral collectors, consequently the melanterite was not disturbed in its growth, until the writer paid his first visit to it on Thursday, April 6, 1933, when he broke off two or three small specimens. A second visit was paid to the locality on Saturday, Aug. 26th, 1933, with a small party, when three or four additional small specimens were broken off.

A later visit was made Tuesday, Nov. 2, 1937, and not even a trace of the melanterite was found even though the rock wall was minutely examined. Evidently during the period intervening between the second and third visits an unusually heavy fall of rain must have completely dissolved the melanterite.

Melanterite (sometimes called copperas) is a hydrous ferrous sulphate that forms on rocks as the result of the decomposition of pyrite or marcasite. Its color is generally green but it may become white, grayish, or brownish on exposure. It has a sweetish, astringent taste (like ink) which easily identifies it. It dissolves in water.

Appreciations

Alfred, Maine—We hope never to give up reading ROCKS AND MINERALS. It has been a big help to us in studying minerals and giving us helpful suggestions for collecting.—Miss Georgia Stearns.

Glen Ridge, N. J.—Although I have been forced to discontinue a number of magazines, I cannot drop your very valuable publication, ROCKS AND MINERALS.—Neil A. Wintringham.

Brooklyn, N. Y.—It was not until I began studying geology as a career that I realized how superior ROCKS AND MINERALS is over all other magazines of its type.—Phil Chenoweth.

Ironton, Ohio—I have just received the January issue of ROCKS AND MINERALS, and I certainly want to congratulate you on the use of the new type. It is much easier to read and I am sure will be beneficial to the magazine.—C. E. Bales.

Harry Ross In New Quarters

Harry Ross, dealer in scientific and laboratory apparatus, formerly of 80 W. Broadway, is now located at 69 Warren St., New York City.

When In Chile Do As The Chilians Do!

Samuel G. Gordon, well known mineralogist and Curator of Mineralogy of the Philadelphia Academy of Natural Sciences, Philadelphia, Penn., demonstrates in the above picture how a mineral collector in the South American republic goes out on a field trip. He is in Chile on a mineral expedition for the institution.

P.S.—We hope Mr. Gordon may bring back with him an extra specimen of molybdenite.

Varni Collects Pseudomorphs In Florida

Stephen Varni, President of the Stephen Varni Co., gem dealers of New York City, spent the first two weeks of January in Florida. In St. Petersburg he called on Mr. James G. Manchester and the two went to Tampa Bay on a little mineral expedition after chalcedony pseudomorphs. A large number of these interesting specimens were found and collected.

DINOSAUR EGGS

Eggs 80,000,000 years old, laid in Mongolia by dinosaurs, are featured in a recent issue of Field Museum News, Chicago, Ill. The museum has a number of the fossil eggs on exhibition in the hall of prehistoric life.

"When the eggs were discovered a few years ago they introduced new evidence as to the life and habits of the extinct reptiles," states Elmer S. Riggs, curator of paleontology, in the article. "Fossil eggs of birds had been known from the Bad Lands of North America, and turtle eggs had been found fossilized in various places, but the possibility of finding the eggs of these great extinct reptiles had remained a matter of speculation.

"These dinosaur eggs were first encountered in a bright red sandstone ledge of Cretaceous age, designated as Flaming Cliffs. They lay in a group embedded in soft sandstone, partly washed out by surface water. Beside them were parts of a reptile skull, and elsewhere in the formation were found skeletons of the small, hooded dinosaur known as Protoceratops. From this association of skeletons and eggs in the same rock formation, it is concluded that the eggs were laid by this dinosaur. They are about four inches in length, and are stained a light reddish color. The exhibit shows them on a section of the sandstone in which they were found.

"The material was collected by Dr. Roy Chapman Andrews, Director of the American Museum of Natural History, on an expedition in which Field Museum collaborated with the New York institution."

WITH OUR MEMBERS

Joe Boyle, of the Children's Musem, Brooklyn, N. Y., toured the northern countries of Europe last fall. Just what he collected and how much at the many interesting mines and quarries he visited is not known. Either he is too modest or else will not commit himself. But some day we will find out.

Several very fine calendars have been issued by two of our members, Ernest Weidhaas, of Pelham, N. Y. (whose real estate office is at 1457 Broadway, New York City), and by Peter MacAdam, Geologist, Benoni, Transvaal, South Africa.

Mr. and Mrs. Irving Reimann, of Buffalo, N. Y., spent most of January visiting mineral localities along the Atlantic seaboard. Although Mr. Reimann remarked casually that they might go as far south as Virginia, we have a strong suspicion that Spruce Pine, N. C., was their real destination. At any rate if word reaches us that the spoil banks of the Deer Park and Fanny Gouge mines were depleted mysteriously of their thulite minerals, then we shall know definitely that they did visit the North Carolina locality.

Mr. Reimann, by the way, is Curator of Geology of the Buffalo Museum of Natural Sciences.

A new locality for ilmenite has been discovered and in New York City by Joe Boyle of the Children's Museum, Brooklyn, N. Y., and some of his proteges. The exact spot is said to be on the Speedway, not far from Dyckman Street. But don't try to look for specimens as the locality is exhausted.

A new occurrence for interesting chalcedony has been found by Joe Cook of Geronimo, Ariz. The locality is in the Gila Mountains near Geronimo.

James G. Manchester, of New York, one of America's most popular mineralogists and author of *Minerals of New York City and Its Environs*, is sojourning in the sunny south—St. Petersburg, Fla., to be exact.

Charles H. Soar, of Santa Cruz, Calif., arrived home Dec. 12th after a trip around the world that lasted eight months. One of the interesting spots visited was the diamond mines at Kimberly, South Africa. We wonder how many diamonds were in that big bag of "rocks" that Mr. Soar brought back with him? Could the bag contain nothing but *diamonds!*

Leonard Morgan, of Burlington, N. J., is a collector who needs watching. If you could only follow him around without being observed he would lead you to localities where unusually fine minerals may be found. But how can you follow him without being observed? If we only knew we would do it ourselves.

Horace W. Slocum of Philadelphia is having the time of his life collecting in North Carolina. On a recent short visit to Spruce Pine he was so charmed with the mineral occurrences that he is now planning to spend two weeks there this coming spring. Incidently Bradley Johnson, of Penland (near Spruce Pine), on whom he called, loaded him down so heavily with specimens that he could just about carry the material from the house to the car.

BIBLIOGRAPHICAL NOTES

Selected Mineral Specimens: A small, pocket-size mineral catalog just issued by Schortmann's Minerals, 6 McKinley Ave., Easthampton, Mass. It consists of 47 pages featuring many choice minerals carried in stock most, of which are of recent acquisition. This enterprising firm is constantly adding new varieties to its already large stock of attractive specimens and it would pay all collectors to get on their mailing list. A charge of 10c is made for the new catalog which sum will be refunded on the first purchase.

Report of the Committee on the Measurement of Geologic Time (1937-1398): Alfred C. Lane, Chairman and John Putnam Marble, Vice-Chairman. Presented at the Annual Meeting of the Division of Geology and Geography, National Research Council, April 30, 1938, 2101 Constitution Ave., Washington, D. C. 123 pages.

Fourth Contribution to Nomenclature of Cambrian Fossils: by Charles Elmer Resser. 43 pp. Published by the Smithsonian Institution, Washington, D. C.

Annual Report of the Quebec Bureau of Mines for the Calendar year 1936: Part B—Simard (Expanse) Lake Map-Area, Temiscamingue County, by Bertrand T. Denis, pp. 3-22; Suzor-Letondal Map-Area, Laviolette, Saint-Maurice and Abitibi Counties, by Carl Faessler, pp. 23-36; Bruneau Township and Surrounding Area, Abitibi District, by G. Vibert Douglas, pp. 37-60; and Grevet (Kamshigama Lake) Map-Area, Abitibi District, by W. W. Longley, pp. 61-77.

Rappert Sur L'Industrie Minerale, 1937: (in French). Issued by the Gouvernment General de L'Afrique Occidentale Francaise, Dakar, Senegal, Africa. 21 pp.

Bulletin du Service des Mines: (in French). Issued by the Gouvernment General de L'Afrique Occidentale Francaise, Dakar, Senegal, Africa. 93 pp., 14 plates.

COLLECTORS AVAILABLE

Easthampton, Mass.—In response to your appeal "The Editor asks a favor," which appeared in the Nov. 1938 issue of ROCKS AND MINERALS, I submit not maps but men who are always ready to lead or supply information to visitors in their respective localities:

John Brodrick, 17 Forest St., Clinton, Mass.
(Chiastolite localities—Bolton Limestone quarries)

Hugh M. Albee, 237 Walnut Hill St., Orange, Mass.
(Old and obscure localities of Massachusetts)

C. Vander Veer, Route 5, Amsterdam, N. Y.
(Herkimer County quartz crystals)

M. L. Shaw, Gen. Del., Val D'Or, Que., Canada
(Silver and associated minerals of Ontario)

John Kitson.